

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

Listing of Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Canceled)
2. (Canceled)
3. (Currently Amended) A system according to claim 1 or 2 for humidifying a reactant gas for use in a fuel cell, said system comprising:
a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;
a humidification assembly adjacent to said housing, said humidification assembly comprising:
a source of humidifying liquid; and
a porous wick for carrying the humidifying liquid from the source of the humidifying liquid into the humidification chamber, said porous wick comprises
comprising a material selected from the group consisting of metals and ceramics, and
separating the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the reactant gas traveling through the humidification chamber.
4. (Previously Presented) A system according to claim 3, wherein said porous wick comprises a ceramic formed from a mixture of water, nitric acid, hollow polymer spheres, and at least one substance selected from the group consisting of a zirconium compound, aluminum oxide, and silicon oxide.

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

5. (Previously Presented) A system according to claim 3, wherein said porous wick is composed of a metal formed from a mixture comprising metal powder, a binding agent, water, and hollow polymer spheres.
6. (Previously Presented) A system according to claim 5, wherein said metal powder comprises at least one substance selected from the group consisting of iron, chromium, bronze, brass, copper, and nickel.
7. (Currently Amended) A system according to claim ~~1-or-2~~ 3, wherein said porous wick comprises approximately 50% to approximately 95% void volume.
8. (Currently Amended) A system according to claim ~~1-or-2~~ 3, wherein said porous wick defines a plurality of interconnected voids.
9. (Previously Presented) A system according to claim 8, wherein the diameter of each of said voids is between approximately 10 microns and approximately 50 microns.
10. (Previously Presented) A system according to claim 8, wherein substantially each void intersects with at least one adjacent void to form a substantially circular window at each intersection.
11. (Previously Presented) A system for humidifying a proton exchange membrane in a fuel cell, said system comprising:
 - a fuel cell having a proton exchange membrane; and
 - a porous wick for humidifying the proton exchange membrane of the fuel cell, said wick comprising a ceramic formed from a mixture comprising water, nitric acid, hollow polymer

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

spheres, and at least one substance selected from the group consisting of a zirconium compound, aluminum oxide, and silicon oxide.

12. (Previously Presented) A system for humidifying a proton exchange membrane in a fuel cell, said system comprising:

a fuel cell having a proton exchange membrane; and
a porous wick for humidifying the proton exchange membrane of the fuel cell, said wick comprising a metal formed from a mixture comprising metal powder, a binding agent, water, and hollow polymer spheres.

13. (Previously Presented) A system according to claim 12, wherein said metal powder comprises at least one substance selected from the group consisting of iron, chromium, bronze, brass, copper, and nickel.

14. (Previously Presented) A system according to claim 11, 12, or 13, wherein said wick comprises approximately 50% to approximately 95% void volume.

15. (Previously Presented) A system according to claim 11, 12, or 13, wherein said porous wick defines a plurality of interconnected voids.

16. (Previously Presented) A system according to claim 15, wherein the diameter of each of said voids is between approximately 10 microns and approximately 50 microns.

17. (Previously Presented) A system according to claim 15, wherein substantially each void intersects with at least one adjacent void to form a substantially circular window at each intersection.

18. (Canceled)

19. (Canceled)

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

20. (Currently Amended) A method according to claim 18 or 19 for humidifying reactant gases for use in a fuel cell, said method comprising the steps of:

providing a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;

further providing a humidification assembly adjacent to said housing, said humidification assembly comprising a porous wick and a source of humidifying liquid, wherein said porous wick

comprises a material selected from the group consisting of metals and ceramics,
and

separates the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the reactant gas traveling through the humidification chamber;

communicating the humidifying liquid into the wick;
receiving the reactant gas in the humidification chamber; and
humidifying the reactant gas with humidifying liquid as the reactant gas flows across the wick in the humidification chamber.

21. (Currently Amended) A method according to claim 20 for humidifying reactant gases for use in a fuel cell, said method comprising the steps of:

providing a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

further providing a humidification assembly adjacent to said housing, said humidification assembly comprising a porous wick and a source of humidifying liquid, wherein said porous wick

comprises a ceramic formed from a mixture comprising water, nitric acid, hollow polymer spheres, and at least one substance selected from the group consisting of a zirconium compound, aluminum oxide, and silicon oxide, and

separates the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the reactant gas traveling through the humidification chamber;

communicating the humidifying liquid into the wick;
receiving the reactant gas in the humidification chamber; and
humidifying the reactant gas with humidifying liquid as the reactant gas flows across the wick in the humidification chamber.

22. (Currently Amended) A method according to claim 20 for humidifying reactant gases for use in a fuel cell, said method comprising the steps of:

providing a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;
further providing a humidification assembly adjacent to said housing, said humidification assembly comprising a porous wick and a source of humidifying liquid, wherein said porous wick [[is]]

comprises a metal formed from a mixture comprising metal powder, a binding agent, water, and hollow polymer spheres, and

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

separates the source of humidifying liquid from the humidification chamber such that the humidifying liquid flows through the wick before humidifying the reactant gas traveling through the humidification chamber;

communicating the humidifying liquid into the wick;

receiving the reactant gas in the humidification chamber; and

humidifying the reactant gas with humidifying liquid as the reactant gas flows across the wick in the humidification chamber.

23. (Previously Presented) A method according to claim 22, wherein said metal powder comprises at least one substance selected from the group consisting of iron, chromium, bronze, brass, copper, and nickel.

24. (Currently Amended) A method according to claim ~~18 or 19~~ 20, wherein said porous wick comprises approximately 50% to approximately 95% void volume.

25. (Currently Amended) A method according to claim ~~18 or 19~~ 20, wherein said porous wick defines a plurality of interconnected voids.

26. (Previously Presented) A method according to claim 25, wherein the diameter of each of said voids is between approximately 10 microns and approximately 50 microns.

27. (Previously Presented) A method according to claim 25, wherein substantially each void intersects with at least one adjacent void to form a substantially circular window at each intersection.

28. (Currently Amended) A system for humidifying a reactant gas for use in a fuel cell, said system comprising:

Application Serial No.: 09/895,687
Examiner: Mark Ruthkosky
Attorney Docket No.: SE-30

a housing defining a humidification chamber through which a reactant gas travels before participating in an electrochemical reaction in a fuel cell;

a humidification assembly adjacent to said housing, said humidification assembly comprising:

means for supplying humidifying liquid; and

means for wicking the humidifying liquid from said supplying means into the humidification chamber;

said wicking means

comprising a material selected from the group consisting of metals and ceramics,

and

separating the supplying means from the humidification chamber such that the humidifying liquid flows through the wicking means before humidifying the reactant gas traveling through the humidification chamber.